



JCAT: A Bayesian inference/belief network tool from AFRL

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JCat Goals



- To develop a fully Bayesian temporal causal modeling system that is both computationally feasible and theoretically sound
- Eliminate common independence assumptions which degrade the resolution of models
- Construct an environment to allow quick easy use of powerful modeling technology
- Provide cutting edge capabilities to users across the DoD



Uncertainty is not Intuitive

- A disease Infects 1% of the Population
- There is a test with 99% accuracy.
 - 99% of sick people are positive
 - 99% of well people are negative
- You test positive
 - What is the probability you are sick?



$$p(s|+) = p(+|s) * p(s) / p(+)$$

Java Causal Analysis Tool

File Edit View Tools Help

Property Viewer

Applies to	Patient
Process GUID	4db9a384-11fe-48e2-a...
Leak	0.01
Scheme Attrib	
Default Causal	0.75
Default Inhibiting	0.8
Default Effecting	1.0

Timing

Probability Profiles

100
75
50
25
0

0

1

Disease Exists [Patient]

Evidence - Disease Exists - Patient

Absolute Evidence Sensor Evidence

Reports

Time	False Ala...	Missed D...	Report
0	0.01	0.01	true

Time: 0

False Alarm Rate: 0.01

Missed Detection Rate: 0.01

☒ Report Was True?

Add Report

Delete Report

Delete All

OK Cancel

Disease Exists Patient

E

Sampler Status: Stopped [2212504 samples]

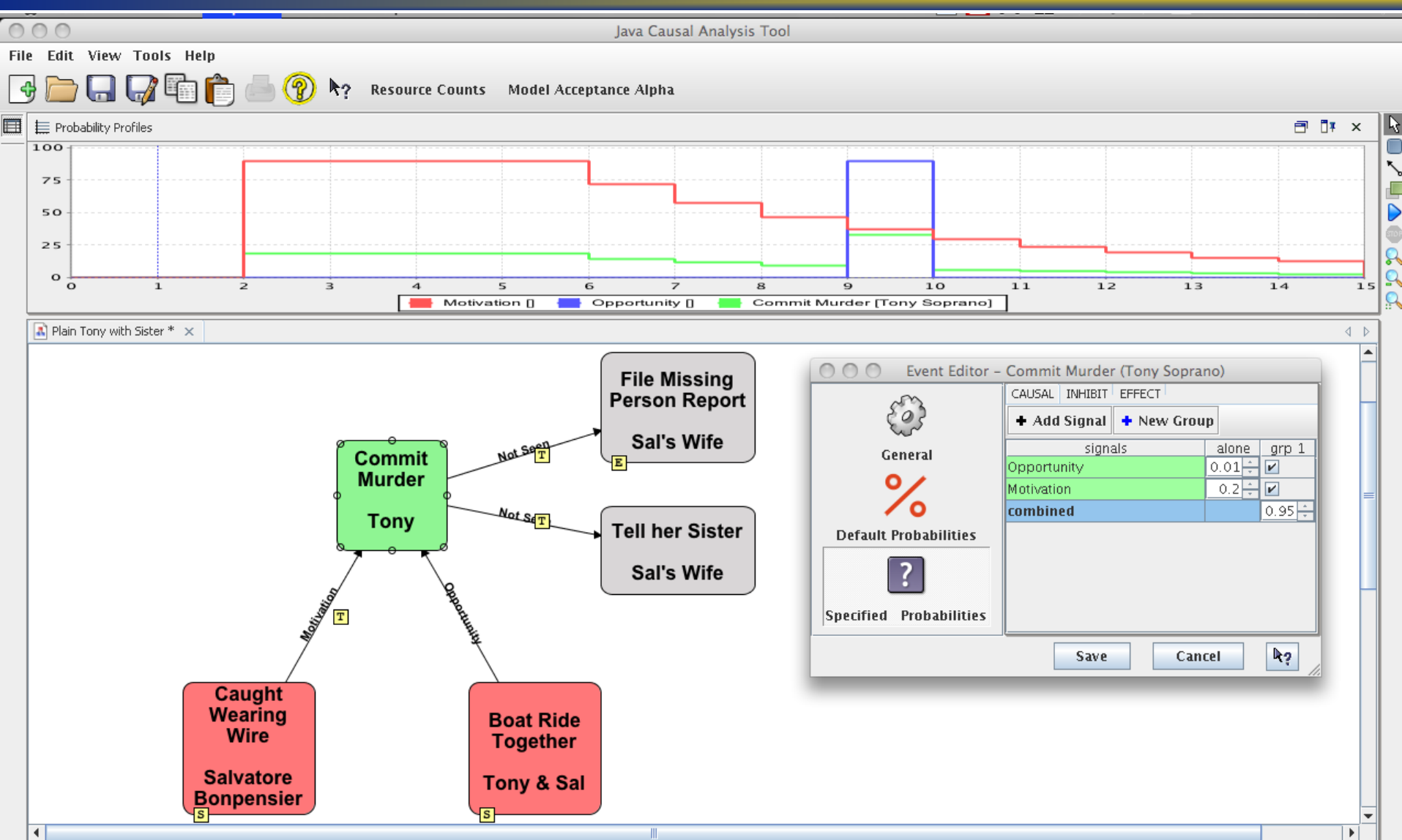
Plan Server Status: Offline

116M of 188M

9:39:18 AM

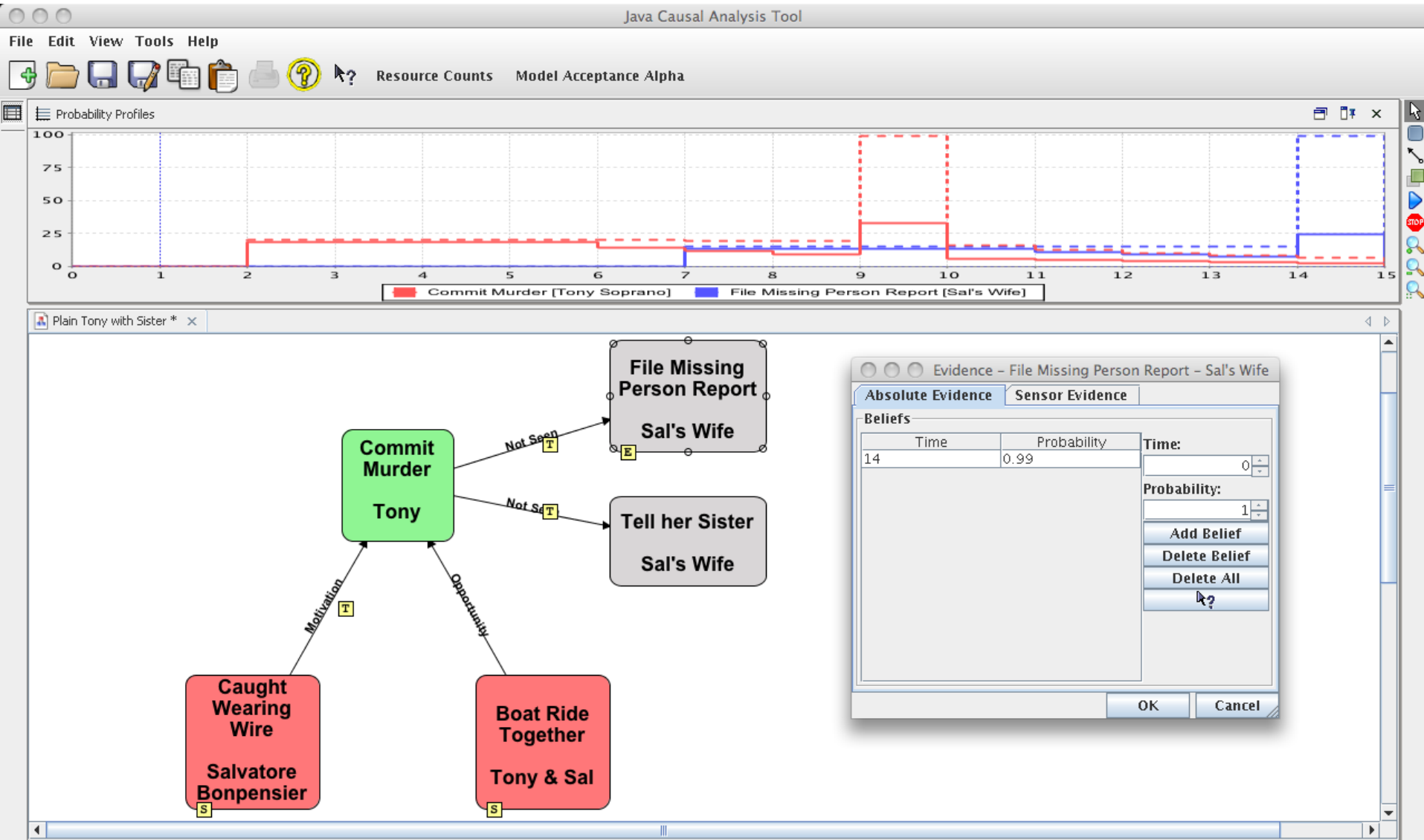


Behavior of a Mob Guy





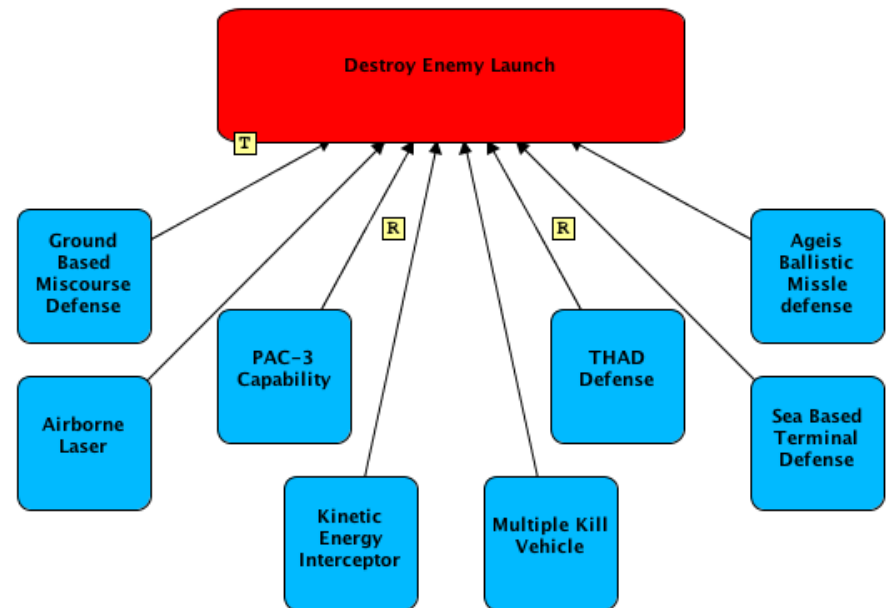
Evidence





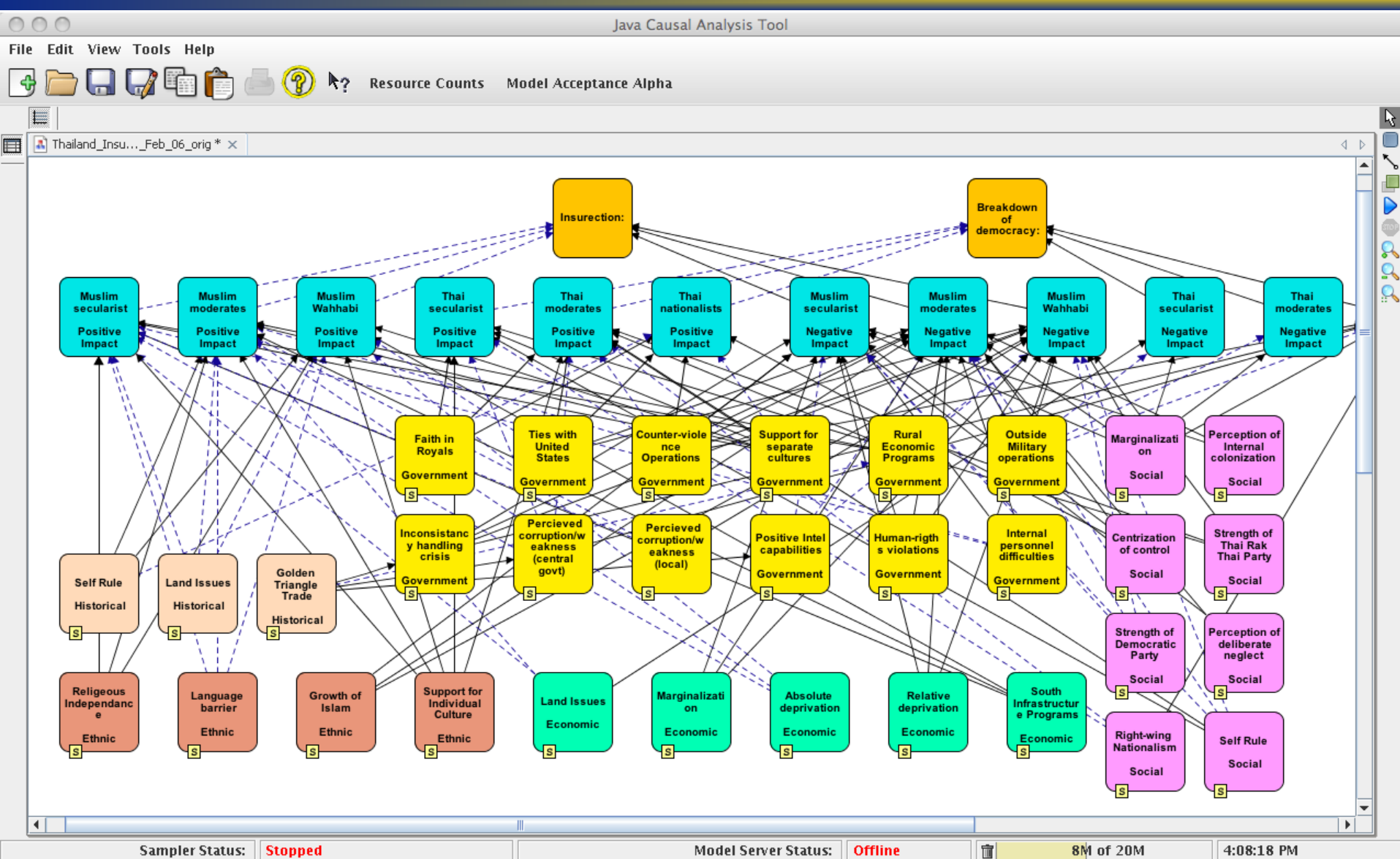
Usability

- Standard Bayesian Systems would require 256 parameters to be entered
- Recursive Noisy OR (RNOR) reduces required user input
- Reduces the burden of making a high resolution model





Real World Scenario





Summary

- JCat provides powerful temporal modeling capabilities in an easy to use platform
- Allows models to be quickly updated and tested
- Incorporation of real world observations in to predictive models
- Has been used successfully on real problems with open source information



Questions?



Ask me for a demo

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